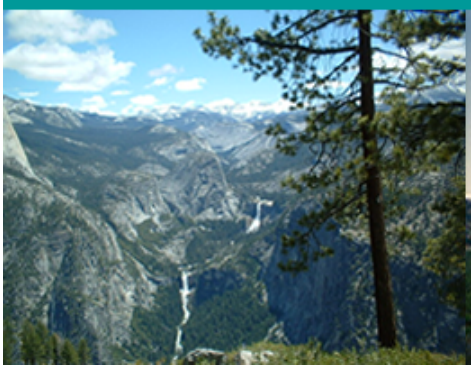
# In The Clear

**The Weather Newsletter For Interior Central California**



Late Winter 2008 Edition National Weather Service/Hanford, CA

## Editor's Corner

The last few weeks for me have certainly been an interesting time with my career with the National Weather Service. On a local level I have had the chance to work with our staff in a team effort for a variety of high impact weather events – winter rain and snow storms, high wind events and dense fog episodes. Certainly this winter has been much stormier than last year and this newsletter will take a look back at some of the highlights so far. During the last week of January, I had the opportunity to travel to Norman, Oklahoma to take part in a training course for radar. This is a required course for all new meteorologists with the NWS and it was certainly interesting to learn about how the whole severe weather warning decision process works as well as the future of radar. As I conclude this edition, it's time for me officially to sign off as Editor of this newsletter as I get ready to begin the next stage of my career as a forecaster at the NWS office in Las Vegas, NV. I would like to thank everyone here in Hanford for their guidance in the early days of my NWS career – I'm sure it will be put to good use as I venture off to a new place.

Sincerely,

Chris Stachelski
Newsletter Editor

A special thanks is extended to all of the staff members who contributed articles for this newsletter as well as to David Spector, the office webmaster. Lastly, a special thanks is also extended to Steve Mendenhall, Meteorologist In Charge, for his overview of this newsletter. All photos not credited within this issue were provided by the HNX staff.

*Looking up the Merced River towards Half Dome in Yosemite National Park on January 7, 2008 after a a series of storms impacted Interior Central California.*

## Inside This Issue…

# Climate Corner

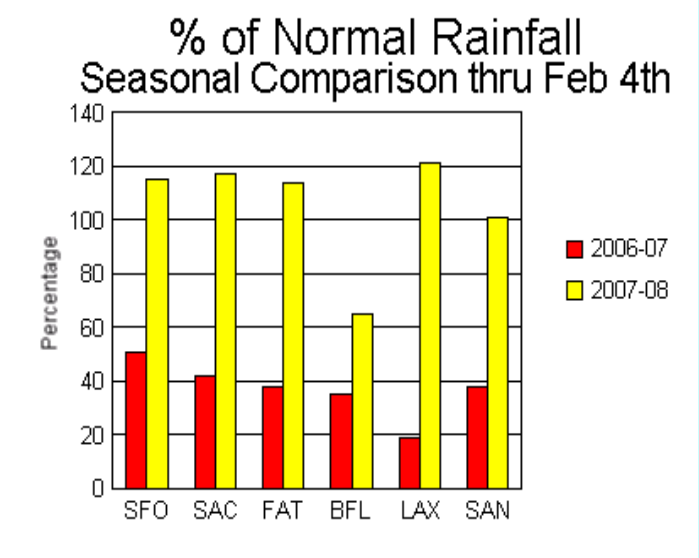
*Chris Stachelski*
*Meteorologist Intern*

*The National Weather Service Office in Bakersfield at Meadows Field Airport in 1984.*

Several new products are now available on the Climate section of our office webpage. Thanks to our office webmaster, David Spector, precipitation data back to the start of records in 1927 has been added for Ash Mountain. This data is available under the “local data/records” section of our webpage and includes both liquid precipitation and snowfall totals by month, year and season. In addition, two new publications have been completed and will be released after a final review by Western Region Scientific Services Division. The Climate of Fresno and The Climate of Bakersfield are the first two comprehensive publications on the climate of these two cities compiled by the National Weather Service. These publications feature an extensive collection of daily, monthly, seasonal and annual records and normals as well as the history of weather observations in each city. Both of these publications will be available soon on our office webpage for you to view in their entirety.

# What a Difference A Year Makes…

The early part of last winter as well as the entire 2006-2007 water season was noteworthy for just how dry it was. An active weather pattern from mid-December to early February resulted in a real flip-flop compared to one year ago. The graph below sums it all up.




*Graph compiled by Kevin Durfee.*

# Attention!

Do you have a weather station? If so consider joining our Mesonet. For details, contact Jim Dudley, Mesonet Focal Point at: james.dudley@noaa.gov

*Trees in Yosemite Valley coated in fresh snow on January 7, 2008.*

# *Wet, White and Windy*

## *Four Significant Pacific Storms Leave Their Mark on Interior Central California*

*Chris Stachelski*
*Meteorologist Intern*

Although the “wet season” of 2007-2008 got off to an active start in September and October, things quieted down greatly in November. Only one notable storm system impacted the region during that month, and most areas received their entire precipitation for the month from that system. By December, however, the weather across interior Central California typically becomes more active as storm systems usually pass through the region in greater frequency and often much more potently. This year was no exception.

***December 18-19, 2007***

The first noteworthy storm of the 2007-2008 cold season moved southward into the region on December 18th from the Pacific. This storm had plenty of moisture to work with as well as a sufficient supply of cold air. Snow levels dropped as low as 4,000 feet in the Sierra Nevada near Yosemite and as low as 5,000 feet further south in the Sierra. At least four inches of snow fell in Yosemite Valley, however in the higher elevations of the Sierra, especially above 7,000 feet, the snow that did fall was measured in feet. Blackcap Basin at an elevation of 10,300 feet received over 3 feet of snow – 42.8 inches. Other amounts included 39.9 inches at Upper Burnt Corral (elevation 9,700 feet), 33.5 inches at Tenaya Lake (8,150 feet) and 28 inches at Lodgepole (elevation 6735 feet).

While the higher elevations received the first big snow of the season, lower elevations saw rainfall and in some cases significant amounts. Rainfall amounts in excess of one inch fell from the west side of the central San Joaquin Valley eastward towards the foothills of Mariposa, Madera and Fresno Counties. Rainfall amounts of over 2 inches were recorded in parts of the foothills, with 2.43 inches at Jerseydale. The City of Fresno received 1.83 inches for this storm at the Fresno-Yosemite International Airport – with a daily record of 1.64 inches falling on December 18th. This broke the old record for the 18th of 1.01 inches set back in 1921. This was Fresno's biggest rainfall total of the year. One spotter in Clovis recorded nearly three-quarters of an inch of rain in just 90 minutes! Other rainfall totals from the Fresno area included 1.96 inches in northeast Clovis, 1.74 inches in Clovis and 1.09 inches in Northwest Fresno. Much of the rain fell in a short period of time during the late evening hours of the 18th into just shortly after midnight on the 19th leading to street flooding in poor drainage areas as well as the flooding of a few homes.

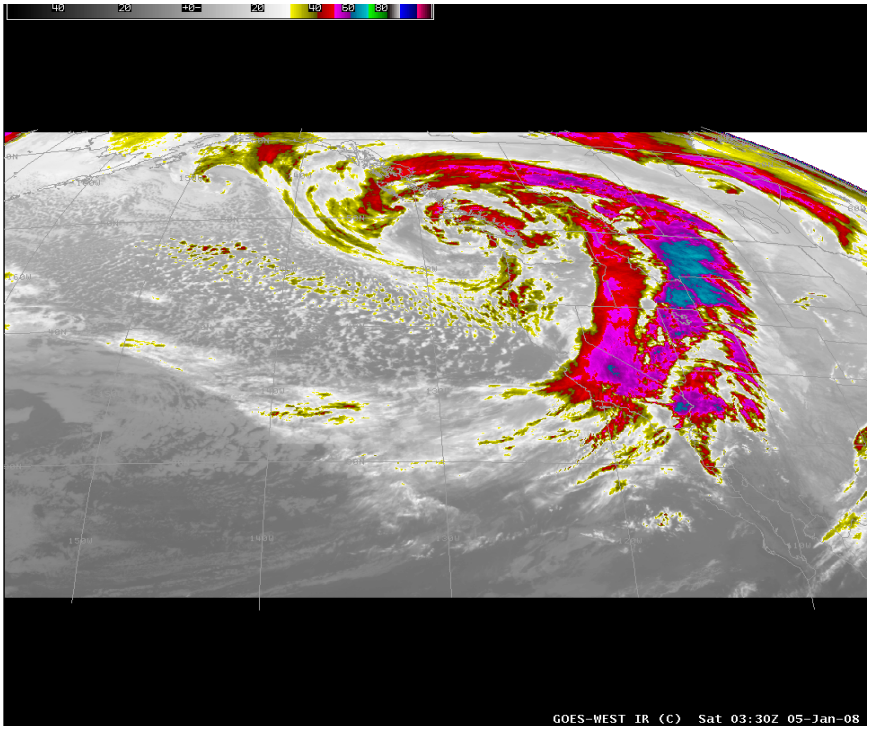
***"The Monster Storm" of January 4-5, 2008***

One of the most powerful storm systems to affect California in years roared in from the eastern Pacific on January 4th. Dubbed "The Monster Storm" by the media because it was such a powerful storm system, it clobbered much of the Golden State with heavy rains, strong winds and significant mountain snow. The surface pressure of the low (storm system) bottomed out at an incredible 956 millibars or 28.30 inches off the coast of Washington! A pressure this low is associated with a Category 3 hurricane!

Across the southern Sierra Nevada above 8,000 feet as much as 5 feet of snow fell in just 24 hours. Additional systems in the wake of the parent system brought snowfall totals exceeding 100 inches – over 8 feet – by the late night hours of January 6th. Horse Meadow, at 8400 feet, received 102 inches of snow and Blackcap Basin at 10,300 feet received 101 inches of snow! Between 4,000 and 7,000 feet, precipitation initially fell mainly as rain before turning to snow at the end. Orographic lift combined with a copious supply of moisture generated heavy rains at these elevations, which due to dry antecedent ground conditions resulted in reports of flooding. The Wawona area of Yosemite National Park received 9.41 inches of rain in just 24 hours on the 4th with a storm total precipitation of 11.32 inches for the period of January 3rd through the morning of the 7th. Other impressive amounts on the 4th included 6.02 inches of at Shaver Lake, 5.90 inches at Hume Lake and 5.17 inches at Bass Lake. In the San Joaquin Valley, rain shadowing cut back on amounts in the southern part of the valley greatly with just 0.09 inches at Bakersfield. However, amounts increased greatly further north. Fresno received 1.23 inches from the 4th into the morning of the 5th and as a result, a few poor drainage areas in the city had some nuisance flooding.

In addition to the precipitation, potent winds developed ahead of and along a cold front that moved southward in association with “The Monster Storm”. Wind gusts of 40 to 55 mph were common across the central and southern San Joaquin Valley as well as in the nearby Sierra Nevada foothills. Crane Flat in Yosemite National Park clocked the highest measured wind gust anywhere in the area at 75 mph.

While most areas escaped damage from the winds, this was not the case in Avenal in Kings County. Winds estimated at 70 mph tore off roofs, downed trees and flipped over two planes at the gliderport. Two people here were injured – a boy injured by a tree branch that fell and a man when a tree fell on his mobile home.




*Infrared satellite loop of “The Monster Storm” as it bears down on interior Central California on January 4th.*

*Impacts from “The Monster Storm” across interior Central California included wind damage in Avenal (left) and heavy, wet snow in the higher elevations of the Sierra Nevada (right).*

***January 22-24, 2008***

Two separate storm systems brought an active stretch of weather to the Central California interior from the 22nd through the 27th. The first system arrived on the 22nd from the eastern Pacific. Accompanied by very cold air, this system was noteworthy for dropping snow levels down to 1,000 feet. Accumulating snow was recorded in not just the Sierra Nevada foothills, but also in the Temblor and Diablo ranges. Two to four inches of snow fell in the coastal range at or above 2,000 feet. In the Sierra Nevada foothills, as much as 7.5 inches of snow fell in North Fork at 2,600 feet. Further south in the Tehachapi Mountains, abundant moisture flowing northward from the Pacific was lifted upward by the terrain resulting in hefty snow on the southern portion of the mountain range. Frazier Park received 18 inches of snow from the 23rd into the 24th. The Grapevine was significantly impacted with the interstate being closed at times and vehicles stranded. Snowfall amounts, surprisingly, were not as impressive across the higher elevations of the Sierra as the axis of heaviest moisture remained well west of them for much of this event. Ostrander Lake, at 8200 feet, received only 11.6 inches of snow for instance.

Soaking rains did fall across parts of the San Joaquin Valley once again, mainly along the west side especially from Fresno County northward. Over two inches of rain fell in Coalinga and a number of roads in western parts of Fresno County were covered with at least several inches of water. In the city of Fresno, rainfall was heavier in northwest parts of the city than elsewhere with 1.12 inches of rain falling on the 23rd alone. At the Fresno-Yosemite International Airport, 0.82 inches of rain fell. The heavy rain allowed for a few low-lying roads to flood in the city once again. This was the fourth storm in a four month period from October to January to drop over an inch of rain in Northwest Fresno is 24 hours or less!

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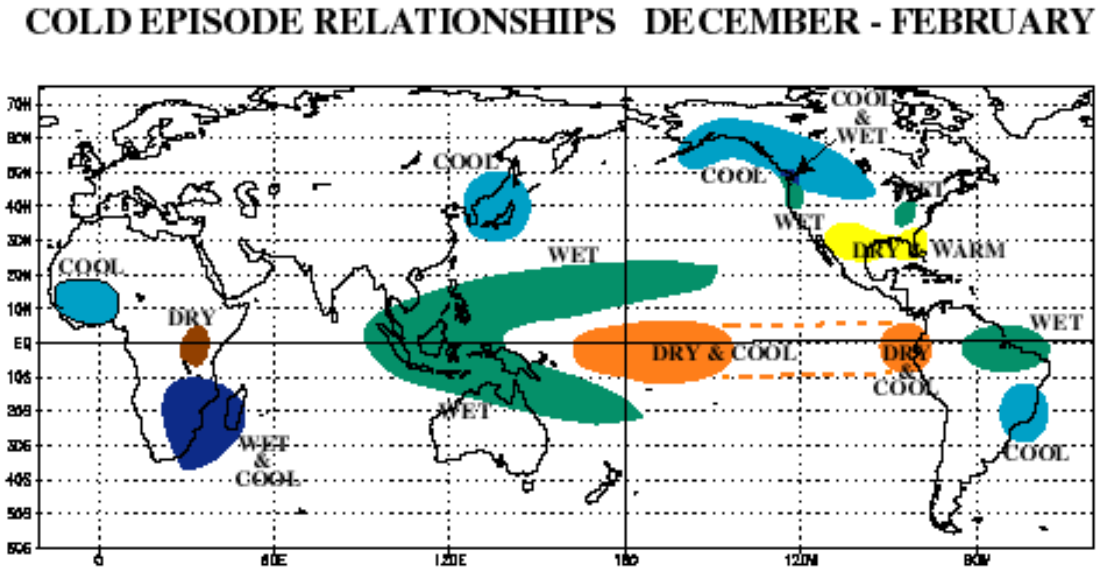
*A tree downed by an EF-0 tornado in Visalia fell on this carport damaging it.*

***January 26-28, 2008***

On the heels of the previous system, an upper-level low dropped southward along the West Coast and eventually became stationary off Point Conception. Snow levels rapidly rose and as a result, this storm unleashed rain on the heavy snow that fell just days earlier in the Frazier Park area resulting in flooding and mudslides. In addition, gusty downslope winds in excess of 60 mph raced down the north facing slopes of the Tehachapi Mountains.

On the afternoon of the 27th, conditions became ripe for thunderstorms to develop across the southern San Joaquin Valley and a few of these reached severe levels. One such thunderstorm moved northeastward across the Visalia area and spawned a brief tornado that resulted in property damage. This tornado was rated an EF-0 and had estimated winds of 60 to 70 mph. Several trees, fences and carports were downed with debris scattered in various directions.

While rainfall amounts were minimal across the southern San Joaquin Valley, the central San Joaquin Valley saw numerous totals between a half of an inch and three-quarters of an inch.




*Climate trends observed during La Niña around the world (courtesy CPC).*

# *La Niña 2007-2008: A Look At Winter Precipitation*

*Chris Stachelski*
*Meteorologist Intern*

Interior Central California receives nearly 90 percent of its annual precipitation in the six month period between November and April. This half of the year is typically characterized by large scale storm systems moving through the region every so many days serving as the primary mechanism for producing precipitation. Most residents of this area will remember last winter – and the water season overall – for being dry.

It should be noted that despite last season being an El Niño episode, only strong El Niños correlate to above normal precipitation in interior Central California. During weak to moderate El Niño events, precipitation totals can be extremely variable. This season La Niña – essentially the opposite of El Niño is present. Just to review, La Niña is when waters in the equatorial region of the Pacific Ocean run cooler than normal, while in El Niño events the water in this same region runs warmer than normal. During La Niña episodes, precipitation in interior Central California tends to run near to below normal. Last fall, your local National Weather Service Office here in Hanford, CA conducted a study of La Niña and El Niño and their impacts on the weather of interior Central California. It was decided to take a closer look at precipitation so far by month this winter and compare it previous La Niña events. For the record, meteorologists refer to winter as the months of December, January and February. Thus, statistics were compiled for each of three months by La Niña episodes, and then compared to normal as well as the observed values this time.

**Monthly Rainfall Totals During La Niña**
**Fresno**

| Episode | Strength of Episode | December Precipitation | January Precipitation | February Precipitation |
|---|---|---|---|---|
| **1950-1951** | Weak | 1.60 | 1.94 | 1.60 |
| **1954-1955** | Moderate | 1.82 | 3.51 | 1.46 |
| **1955-1956** | Strong | 6.73 | 2.41 | 0.65 |
| **1956-1957** | Weak | 0.31 | 1.75 | 1.51 |
| **1961-1962** | Weak | 1.32 | 1.12 | 5.97 |
| **1964-1965** | Moderate | 2.63 | 1.05 | 0.43 |
| **1967-1968** | Weak | 1.04 | 1.05 | 1.10 |
| **1970-1971** | Moderate | 2.51 | 0.40 | 0.29 |
| **1971-1972** | Weak | 2.56 | 0.37 | 0.67 |
| **1973-1974** | Strong | 1.74 | 2.82 | 0.25 |
| **1974-1975** | Weak | 1.26 | 0.69 | 0.97 |
| **1975-1976** | Moderate | 0.14 | 0.04 | 4.72 |
| **1983-1984** | Weak | 1.75 | 0.15 | 1.05 |
| **1984-1985** | Moderate | 1.98 | 0.43 | 0.71 |
| **1988-1989** | Strong | 2.46 | 0.48 | 1.18 |
| **1995-1996** | Weak | 2.12 | 2.07 | 3.57 |
| **1998-1999** | Moderate | 0.62 | 2.82 | 1.18 |
| **1999-2000** | Moderate | 0.03 | 3.15 | 6.12 |
| **2000-2001** | Weak | 0.07 | 2.66 | 2.22 |
| **2007-2008** | N/A | 2.31 | 3.32 | 2.12 |
| **Normal** | N/A | 1.34 | 2.16 | 2.12 |

There are a few interesting trends to note with precipitation in Fresno. Twelve of the twenty La Niña episodes had Decembers with above normal precipitation. Of particularly interesting note is that all three strong La Niña events had wetter than normal Decembers. As winter progresses, the number of wetter than normal months declines to seven in January and just five by February. While strong La Niñas still have a better chance of being wetter than normal (two out of three) during January, all of the wetter than normal Februaries during La Niña episodes were during weak to moderate events. It should also be noted that the wettest December ever – 1955 when 6.73 inches of precipitation fell and the wettest February ever in Fresno in 2000 when 6.12 inches of precipitation was recorded – both occurred during La Niña events. From the variability shown above, it appears Fresno is in a geographic transition zone during La Niña events with precipitation.

**Monthly Rainfall Totals During La Niña**
**Bakersfield**

| Episode | Strength of Episode | December Precipitation | January Precipitation | February Precipitation |
|---|---|---|---|---|
| **1950-1951** | Weak | 0.32 | 1.61 | 0.55 |
| **1954-1955** | Moderate | 0.57 | 1.51 | 0.58 |
| **1955-1956** | Strong | 0.50 | 0.90 | 0.65 |
| **1956-1957** | Weak | 0.05 | 0.82 | 0.70 |
| **1961-1962** | Weak | 0.34 | 0.59 | 4.42 |
| **1964-1965** | Moderate | 0.70 | 0.74 | 0.17 |
| **1967-1968** | Weak | 0.54 | 0.49 | 0.56 |
| **1970-1971** | Moderate | 0.71 | 0.53 | 0.35 |
| **1971-1972** | Weak | 1.17 | Trace | 0.27 |
| **1973-1974** | Strong | 0.79 | 1.16 | 0.13 |
| **1974-1975** | Weak | 1.19 | 0.06 | 1.60 |
| **1975-1976** | Moderate | 0.13 | 0.05 | 1.64 |
| **1983-1984** | Weak | 1.15 | 0.05 | 0.05 |
| **1984-1985** | Moderate | 0.95 | 0.38 | 0.48 |
| **1988-1989** | Strong | 0.82 | 0.16 | 0.81 |
| **1995-1996** | Weak | 2.03 | 1.08 | 2.54 |
| **1998-1999** | Moderate | 0.55 | 3.90 | 0.46 |
| **1999-2000** | Moderate | 0.14 | 0.94 | 1.62 |
| **2000-2001** | Weak | Trace | 1.81 | 2.03 |
| **2007-2008** | N/A | 0.36 | 0.66 | 0.82 |
| **Normal** | N/A | 0.76 | 1.18 | 1.21 |

As was the case in Fresno, December had the most instances of any of three winter months where precipitation was above normal with a total of seven. However, there was not as clear-cut of a connection related to the strength of the La Niña episode. Only four Januaries had above normal precipitation when a La Niña episode occurred. However, February saw an increase in the number of above normal precipitation events during a La Niña with six such months. All Januaries and Februaries during a strong La Niña episode had below normal precipitation. Overall La Niñas tend to be dry in the southwestern United States, which Bakersfield is closer to in distance and is nicely supported by the above table.

For more information on La Niña and El Niño and their impacts on the weather of interior Central California, check out the climate section of our website and click on the “local data/records” section.

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*Some of the vehicles involved in a crash on Interstate 5 that occurred near Coalinga on the day after Thanksgiving in 1991 resulting from a dust storm. Over 100 vehicles were involved. (HNX Archives).*

# *Dangerous Dust*

*Chris Stachelski*
*Meteorologist Intern*

Many travelers are aware of the infamous Tule Fog that often blankets the Central Valley of California during the cool season months. However, another hazard can cause sudden reductions in visibility resulting in dangerous driving conditions – dust. Dust storms are most common in interior Central California in the fall and spring months when storm systems pass through with little precipitation but enough strength to generate gusty winds. As more moisture laden storm systems impact the region in the “heart” of winter, the precipitation from these systems is often enough to wet the soils where it reduces the threat of dirt being picked up and blown around as easily. In years where precipitation runs below normal, the dry nature of the ground can make conditions even more favorable for dust storms to occur.

Dust storms are often sudden in nature. As winds pick up in speed, they lift loose particles of dirt into the air generating clouds or walls of dirt that can sharply lower visibilities and result in poor air quality. These clouds or walls of dust can be as large as several thousand feet high and miles wide. Visibility can easily be at zero.

Many drivers associate dust storms as just a desert phenomena, however, they occur on annual basis as well in the San Joaquin Valley, especially the south end. Last fall, California saw its first dust

storm related fatalities since 1993. One of the largest vehicle pile-ups on record in this area resulted from a dust storm that occurred along Interstate 5 on the day after Thanksgiving in 1991 near Coalinga. Over 100 vehicles were involved and 14 people were killed in this incident.

In the desert, the naturally sandy landscape serves as a source for dust, while in the San Joaquin Valley dust often originates from barren plots of land cleared of any vegetation. Be alert on windy days for lower visibilities. If the visibility drops low enough to where you can no longer see, pull off the road and away from the pavement as far as possible. Stop your car and turn off your headlights. Leaving on your headlights could misguide other vehicles still moving and lead to them crashing into the back of your vehicle. Remain there until visibilities improve and it is safe to proceed.

Here are a few additional tips:

**- Avoid entering areas where you see a dust storm in progress altogether. Don't drive into disaster.**
**- Slow down. Leave plenty of room in between you and any vehicles in front of you. Use the lines of the road to guide you.**
**- If you continue to keep moving on the road, turn your lights on. Use your horn if needed.**
**- Listen for other vehicles. Avoid crossing roads were you cannot see.**
**- Be patient! Avoid passing other vehicles.**
**- Consider not traveling at all until conditions improve.**

## Weather Fact

The largest hail ever recorded in the area of responsibility of the National Weather Service Office in Hanford was 2.5 inches in diameter in Lemoore at the Naval Air Station on November 22, 1996.

# Brrrrr!!!!

Just how cold did it get in interior Central California so far this winter? Here is a list of the coldest low temperatures for selected locations around the area. Most of these were recorded back in December of 2007.

| | |
|---|---|
| Auberry | 24 |
| Bakersfield (Meadows Field) | 29 |
| Coalinga | 28 |
| Corcoran | 26 |
| Delano | 26 |
| Florence Lake | -5 |
| Frazier Park | 15 |
| Fresno (Fresno-Yosemite Int'l) | 28 |
| Glennville | 17 |
| Grant Grove | 7 |
| Hanford | 23 |
| Huntington Lake | 6 |
| Inyokern | 17 |
| Kettleman City | 25 |
| Lebec | 16 |
| Lemon Cove | 28 |
| Lindsay | 26 |
| Lodgepole | -2 |
| Los Banos | 27 |
| Madera | 27 |
| Merced | 24 |
| Mojave | 23 |
| North Fork | 16 |
| Oakhurst | 9 |
| Randsburg | 22 |
| Taft | 30 |
| Tehachapi | 16 |
| Tuolumne Meadows | -12 |
| Visalia | 24 |
| Wasco | 24 |
| Yosemite (South Entrance) | 12 |

*Flooding caused by snowmelt in Yosemite National Park at Sentinel Meadows in May 2005. (Photo courtesy National Park Service).*

# *Snowmelt Floods*

*Chris Stachelski*
*Meteorologist Intern*

Snowmelt during the spring months is a natural part of the weather pattern in the Sierra Nevada. As temperatures warm this time of year, snow that accumulated during the winter months begins to melt. The melting of water from a frozen, solid state into a liquid helps to feed streams and rivers in the area. Typically streams and rivers respond to this in a natural, diurnal cycle. Stream and river levels will peak during the evening hours after the heating during the daytime has melted snow into a liquid state and discharged it into streams and rivers. Once the sun sets, the loss of daytime heating occurs, temperatures drop and the rate of snowmelt slows or may even stop altogether. This results in a drop on stream levels where they reach their lowest point typically around daybreak.

Normal snowmelt season typically begins in the Sierra in April and continues into June. However, depending on factors ranging from just how much snow fell during the winter, how stormy the spring

months are or what kind of temperatures occur during the spring months, the snowmelt season may occur earlier, later or extend out over a longer period of time.

Snowmelt can result in flooding when several other factors come into play. If the ground is saturated (meaning it cannot hold any more water), then the water will not be able to soak into the ground and thus will “run off”. If the past winter season has been wet and soil conditions are moist, there will be less ability for the ground to absorb as much water.

Other factors can result in snowmelt flooding as well. This includes heavy rainfall falling on top of a thick snowpack, a rapid melting of the snowpack, a ground still frozen that water has a hard time penetrating into and an overall heavy snowpack for the winter.

In interior Central California, snowmelt flooding is most known to occur in Yosemite Valley, often in May. Visitors to the park should be aware of low-lying areas that are inundated with water when the plan hikes or camping. Obey signs posted by park officials alerting you to any areas that are impacted by floodwaters.

## *Yosemite Valley Fog*

*Fog formed on the Yosemite Valley floor just before sunset on January 7, 2008. The bottom picture was taken facing west.*

# Weather Words

By Forecaster Kevin Durfee

E W W A L M C M R E H T C R S A T A
T T I R A U O A U R O U A U D H U R
S O N N M N I N R R M D R I Y Y E O
I R R U S N I N O U U R A G A T W R
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*adiabatic*
*arid*
*aurora*
*blizzard*
*climate*
*cirrus*
*cumulus*
*cyclone*
*downburst*
*downdraft*
*drizzle*
*el nino*
*fog*
*funnel*
*hygrometer*
*instability*
*monsoon*
*rainbow*
*thermal*
*tornadic*
*twister*
*unstable*
*wallcloud*
*wind*

**See Solution on Page 25**

# *Inside the Storm Predictions Center…*

While much of the forecasting done for interior Central California is done directly at the National Weather Service in Hanford, our office does receive information and products from other offices within the National Weather Service located in various areas across the country for various things. One of these is thunderstorms. While warnings for thunderstorms and tornadoes are issued by the National Weather Service in Hanford, large scale outlooks for thunderstorms as well as Severe Thunderstorm Watches and Tornado Watches are issued by the Storm Predictions Center, or SPC, in Norman, Oklahoma. The SPC moved into a brand new facility in September 2006 on the campus of the University of Oklahoma (OU) as part of the National Weather Center. The National Weather Center is a collaborative effort between the National Weather Service and our parent agency NOAA, the University of Oklahoma and several private weather companies that was designed to foster advancements in meteorology. Below are some photographs that were taken in late January 2008 of the SPC.


*Entrance sign for SPC.*

*Operations area at SPC.*

*Forecaster showing how a watch is issued (close-up at right).*



*Two cities recently became the first StormReady communities in the San Joaquin Valley: in January the City of Clovis (left) became certified and in late February the City of Fresno also became certified (right).*

# *StormReady across the San Joaquin Valley*

*James Brotherton*
*Warning Coordination Meteorologist*

StormReady is a National Weather Service program that helps community leaders and emergency managers strengthen their local hazardous weather operations. Since nearly 90 percent of all Presidentially-declared disasters are weather related, it is vital that communities have the skills and education needed to survive hazardous weather events. StormReady communities are better prepared to save lives and property from the onslaught of severe weather through extensive planning, education, and awareness. Communities have fewer fatalities if they plan before dangerous weather arrives.

No community is storm proof, but StormReady can help communities save lives. In becoming StormReady, emergency managers and other community leaders work together with local National Weather Service offices to complete an application and review process. To be recognized as StormReady, a community must:

- ✓ Establish a 24-hour warning point and emergency operations center.
- ✓ Have more than one way to receive severe weather forecasts and warnings and to alert the public.
- ✓ Create a system that monitors local weather conditions.

- ✓ Promote the importance of public readiness through community seminars.

- ✓ Develop a formal hazardous weather plan including training weather spotters and holding emergency exercises.

Across the NWS Hanford County Warning Area, the past year has seen a heightened interest in the StormReady program by communities, organizations, and county governments. The National Weather Service has already recognized two cities as StormReady communities, Clovis and Fresno. The NWS is extremely pleased that the California Office of Emergency Services is helping the NWS promote the StormReady program across the state. Look for additional recognition ceremonies during the coming months across the area.

Emergency managers and other community leaders considering StormReady for their counties, cities, commercial or industrial sites, are encouraged to contact their local National Weather Service office. Please call Warning Coordination Meteorologist James Brotherton at 559-584-3752. Everything possible will be done to simplify and expedite the process of becoming StormReady. Your support is greatly appreciated with this important program!

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# *Paperless Initiative*

*Paul Jones*
*Cooperative Program Manage*r

Dear Cooperative Observers:

All National Weather Service Offices, including the one in Hanford, have been tasked with starting a paperless observer data initiative. Weather Coder III (WxC3) is the lead program to this end. Of course, before WxC3 there was Weather Coder II (WxC2), which is the precursor system most of you are familiar with.

WxC3 is here and active as of February 1, 2008. It is very user-friendly, with many changes developed from the field test of the WxC2 program. Enclosed with a copy of the letter sent to you in the mail are instructions for both the WxC3 and the Interactive Voice-Remote Observation System (IV-ROCS). These instructions have been provided to aid observers in gaining knowledge on the use of the paperless observing system. All of theservers within our area of responsibility are invited and encouraged to join in on this initiative.

Many of our observers are asking, “What does this mean to me?” The answer is twofold. First, there is no more worry about finding envelopes to send in the B-91 Observation Form or ask the forecast office for more envelopes or forms. The second and most important to you the observer and the forecast office is that data will be received in real-time, to be included in the daily forecast database and the climate database. These data will be immediately available to the forecast office.

No site is required to send in their data daily, but if they so choose, spending just one minute every day outweighs having to take the time inputting an entire month at one once.

We urge all of our observers to look the instructions over and give WxC3 a try. Take it for a spin. We think all of you will like it and IV-ROCS, which is directly connected to WxC3. If there are any questions please call us.

# *Out and About…*





From February 12th through the 14th, the National Weather Service once again staffed a booth at The World Ag Expo in Tulare. This three day event is considered to be the largest agricultural exposition in the world. Some photos from the event: Forecaster Modesto Vasquez and Meteorologist-In-Charge Steve Mendenhall answer questions (top left), Lead Forecaster Jim Bagnall, Electronics Technician Jim Knutson and Forecaster Cindy Bean also took time to answer questions (top right), Warning Coordination Meteorologist James Brotherton answers questions about NWS products (bottom left), and Forecaster David Spector and Lead Forecaster Gary Sanger at the Hanford NWS booth (bottom right).

# *Monthly Memoirs*

*Gary Sanger*
*Lead Forecaster – Climate Services Focal Point*

## DECEMBER WEATHER SUMMARY

As the storm that brought precipitation to the southern third of the central California interior at the end of November moved east, a high-pressure ridge pushed into the state. Temperatures warmed to well above normal, and high temperatures on December 3rd and 4th in the central and southern San Joaquin Valley were over 10 degrees above normal in many locations. Bakersfield warmed to 70 degrees on the 4th, the first time Meadows Field reached 70 degrees since November 16th, when the high was 74.

The first major Pacific storm since late October reached interior central California beginning December 5th. Cold air pushing into the region dropped temperatures back to near normal, and precipitation from the storm finally reached the area during the afternoon of the 6th. There was abundant moisture with this storm, with the heaviest San Joaquin Valley rain during the late afternoon and early evening hours. Precipitation continued through December 7th, and very cold air behind the cold front dropped snow levels down into the higher Sierra foothills. Fresno received a total of 0.31 inch from the storm; in two days, the rainfall at Fresno Yosemite International Airport equaled that received during the months of September, October and November combined.

Locally heavy snowfalls were recorded by spotters and SNOTEL stations in the Southern Sierra Nevada. Chilkoot Meadow received an estimated 32 inches of new snow, with several stations above 7000 feet reporting between 1 and 2 feet of fresh snow.

As the storm dropped through California, a closed upper-level low formed. As this low moved south, an upper-level disturbance rotating around it triggered a few moderate showers over the west side of the San Joaquin Valley on December 8th, mainly from Coalinga south. By late afternoon, rain and snow was spreading into the Frazier Park area of the Tehachapi Mountains, and snow levels were falling, reaching around 3500 feet by Sunday morning. Up to 5 inches of snow fell on Frazier Park during the night of December 8th-9th, and accumulating snow closed the Grapevine (at 4300 feet, 1000 feet lower than Frazier Park) for a time.

The storm moved east of the region on the 9th, but cold air remained pooled over the central and southern San Joaquin Valley, trapped by the surrounding mountains. Valley temperatures during the morning of the 9th bottomed out mostly in the upper 20s to mid 30s, although a few sites cooled to the mid 20s for a couple of hours. This set the stage for a series of nightly frost events, with eight consecutive nights of near- to sub-freezing temperatures for the central .and southern San Joaquin Valley.

An upper-level ridge developed in the east Pacific around mid December, centered near Hawaii. A series of storms rode over the ridge and into California, carried by a jet stream that had speeds of nearly 200 knots at times. While the first storm brought only light rain to the San Joaquin Valley, and a few inches of snow to the higher elevations of the Southern Sierra

Nevada, the main impact was to weaken the ridge and allow a stronger and more potent storm to reach central California beginning the night of December 17th-18th.

This second storm brought over a half-inch of rain to parts of the San Joaquin Valley floor. Flooding was reported in the Fresno metropolitan area, mainly due to the combination of locally heavy rains and poor drainage.

Very cold air accompanied the storm, settling into Yosemite Valley and resulting in over 4 inches of new snow to the Valley floor at an elevation of 4000 feet. In the high country, between 2 and 3 feet of new snow fell, spreading as far south as the Tulare County mountains, where Lodgepole measured 28 inches of new snow. Further south, as much as 6 inches of snow fell near the crest of the Tehachapi Mountains.

The third storm reached interior central California during the night of December 19th. This storm brought up to a foot of snow to the high country of the Southern Sierra Nevada north of Kings Canyon, and gusty winds to the Kern County mountains and the Indian Wells Valley. Gusts as strong as 64 mph were recorded in the Piutes (at the south end of the Sierra Nevada range), and there were several reports of gusts in excess of 45 mph.

The cold air that accompanied the storms settled into the San Joaquin Valley, plunging lows into the 26-31 degree range on the morning of the 21st. Another round of near-freezing temperatures was seen in the central and southern San Joaquin Valley the next day.

An upper-level ridge built into California behind the storms, bringing a stable airmass to the region. Areas of dense fog developed during the early hours of December 22nd, and lingered over the east side of the San Joaquin Valley into the afternoon. Fog became more widespread overnight, then lingered in some areas through the 24th into the morning of Christmas Day.

*Dense fog in Northwest Fresno on Christmas Eve.*

A weak upper-level trough moved through central California during the evening of December 25th. The main impacts were to bring a few showers to the Southern Sierra Nevada and Tehachapi Mountains (including the foothills), and to delay the onset of dense Valley fog until around 3:00 AM on the 26th. Behind the trough, gusty winds developed over the mountains and deserts, with numerous gusts to 50 mph, and a peak gust of 75 mph measured at the Mojave air/spaceport. The cold air that pushed into the San Joaquin Valley with the trough brought sub-freezing temperatures to the central and southern San Joaquin Valley, with several lows around 28 degrees on the morning of the 27th.

A second weak trough reached the area the night of December 27th-28th, bringing some sleet to the central and southern San Joaquin Valley, and snow fell in the Sierra foothills as low as 2500 feet; one inch of snow fell at 3300 feet near Mariposa.

A strong northwest flow aloft over California brought yet another impulse over central California during the night of December 28th

through the 29th, bringing another round of light precipitation to the region. A fourth weak trough arrived the next night, then an upper-level ridge built into California from the east Pacific, pushing the jet stream east of California. This ended the precipitation over central California, but the stable airmass also brought dense fog to the central and southern San Joaquin Valley to close out the year.

*A cloud drifts across the higher terrain overlooking Yosemite Valley after a winter storm moved through the region on January 7, 2008.*

**JANUARY 2008 WEATHER SUMMARY**

New Year Day arrived with a band of dense fog extending the length of the central and southern San Joaquin Valley, although drainage winds off the surrounding mountains kept the edges of the Valley fog free. East winds gusting to 25 mph through the Kern River Canyon also kept much of Kern County clear of fog. The fog was the result of an upper-level ridge that brought a stable airmass to the region. The ridge quickly gave way to a series of storms that stretched across the Pacific, bringing the first episode of significant precipitation to the region for the year,

The first storm arrived in the central California interior late on January 3rd. It stayed mostly over northern California, and its main impact on the region was to weaken the ridge in advance of the second, stronger storm. This storm arrived the next day, and brought heavy snow to the Southern Sierra Nevada, and rain to the San Joaquin Valley.

Very strong winds developed on the west side of the San Joaquin Valley with this storm, with gusts to 66 mph recorded at Kettleman Hills during the afternoon of January 4th. The strongest winds occurred in the town of Avenal, where roofs were damaged, trees toppled and two gliders lifted off the tarmac and flipped over. Based on the observed damage, it was estimated that the highest gust could have exceeded 70 mph. Elsewhere in the central and southern San Joaquin Valley, there were gusts to 35 to 45 mph.

The third storm, which originated over Siberia, brought a very cold airmass to central California on the 5th and 6th. Snow fell down to 3500 feet, into the upper Sierra foothills. Total snow accumulations in the Southern Sierra Nevada for the three storms ranged from nearly 9 feet in the high country near Yosemite National Park, to 5 feet in the Tulare County mountains. Further south, as much as a foot of new snow at Frazier Park in the Tehachapi Mountains.

After a brief respite, yet another storm reached California on January 8th. Although this storm brought several inches of snow to the Southern Sierra Nevada, it was a warmer storm than its predecessors, and snow levels remained above 5000 feet.

In the wake of these storms, there was appreciable low-level moisture over the San Joaquin Valley. An upper-level ridge again brought a stable airmass to central California, but the result was the formation of a stratus layer during the night of January 11th-12th, rather than dense fog in the Valley. However, the stratus spread into the Sierra foothills, creating pockets of very low visibility where the stratus pushed into the slopes. The stratus layer remained over the central and southern San Joaquin Valley through the day of the 12th, with some patchy dense fog developing around sunrise, and continued into the morning of the 13th. Skies over the central and southern San Joaquin Valley finally cleared during the afternoon.

The ridge remained in place for several days, with widespread dense fog blanketing the central and southern San Joaquin Valley during the night of January 14th-15th. The fog subsequently lifted into a stratus layer over the region by midday on January 15th. The stratus layer was deep enough to cause areas of low visibility not only in parts of the Southern Sierra Nevada foothills, but also along the Valley-facing slopes of the Tehachapi Mountains and locally into the passes, with the California Highway Patrol reporting visibilities as low as 300 feet near the town of Keene in the Tehachapi Pass. The stratus also produced a heavy drizzle over the south end of the San Joaquin Valley, with 0.01 inch of water falling at Meadows Field, Bakersfield.

The stratus broke up on the 16th, allowing patchy frost and locally dense fog to develop during the early morning hours. This weather continued through the morning of January 20th, then a dry cold front moved through the state, breaking down the ridge.

The next Pacific storm reached the central California interior on the 22nd, with snow falling as far south as Mount Pinos by sunset. The upper-level low stalled west of Monterey Bay, spinning moisture into the Hanford warning/forecast area from the south, with snow falling the length of the Southern Sierra Nevada and the Tehachapi Mountains. A persistent rain band over the west side of the San Joaquin Valley brought locally heavy rain to the Temblors and Diablo Range on January 23rd. Runoff from these mountains causing some road flooding in western Fresno and Kings Counties. Several inches of snow fell on the Grapevine beginning on the 22nd, and in the Los Angeles County mountains near Gorman. At Frazier Park, about 1000 feet higher than the Grapevine, a spotter measured 18 inches of fresh snow. Interstate 5 was closed at the Tejon Pass late in the afternoon of the 23rd, with one report estimating that the number of stranded cars was over a hundred. The Interstate remained closed through the 24th, before finally reopening the next morning.

The very cold airmass accompanying the storm even caused snow to fall on the Temblors and Diablo Range on the west side of the San Joaquin Valley. Two inches of snow fell at the 2000 foot level near the Fresno-Monterey County line. However, with the upper-level low remaining offshore, there initially was a fairly sharp boundary marking the edge of the precipitation. Rain was slow to spread into the eastern half of the San Joaquin Valley, and many locations in the Southern Sierra Nevada received less than a foot of new snow.

When the precipitation band finally shifted eastward during the evening of the 23rd, locally heavy rains caused some street flooding in Fresno, Kings and Madera counties.

Another upper-level low dropped south along the coast, kicking the first low inland. This next low became nearly stationary southwest of Point Conception on the 26th. This low brought strong downslope winds through the Tejon Pass into the south end of the San Joaquin Valley. Southeast winds with sustained speeds of 68 mph were measured at the base of the

Grapevine for about 2 hours late in the evening of January 26th, with a gust to 65 mph reported as far north as Bakersfield. That gust was on the east side of the city; the highest gust measured at Meadows Field was 49 mph.

Subtropical moisture spinning around the low brought heavy rain to the Tehachapi Mountains west of the Grapevine. Because of the subtropical nature of the moisture, the snow levels were high and warm rain fell on the nearly 2 feet of snow at Frazier Park from the previous storm. As the ground saturated, mud slides developed on the mountain slopes, closing Frazier Mountain Park Road and triggering the issuance of a Flash Flood Warning for mud/debris flows. Runoff from the Tejon Pass flowed into the south end of the San Joaquin Valley, causing flooding of parts of the Copus and David Roads.

In the Kern County deserts, rain falling on the El Paso Mountains resulted in flooding of the Garlock and Red Rock-Randsburg Roads along the south flanks of the mountains.

The warm, unstable airmass also triggered outbreaks of severe weather over western Tulare County on the 27th. A severe thunderstorm developed south of Visalia shortly after noon, and spawned a tornado that knocked down trees and damaged a trailer park. The tornado, rated EF-0 on the Enhanced Fujita Scale, was the first tornado to hit the central or southern San Joaquin Valley since March 28th, 2006, when an EF-0 tornado touched down 1 mile southeast of the city of Merced. The last tornado to hit Tulare County had been an F-0 that touched down 5 miles southeast of Dinuba on October 20th, 2004.

A strong thunderstorm formed shortly after 4 PM, again south of Visalia, and passed over the east side of the city. This storm was weaker than the earlier thunderstorm, but did produce ¼-inch hail.

The storm continued through the 28th. Fresno recorded another third of an inch of rain that day, and winds gusted to 33 mph at Fresno-Yosemite International Airport. Very little rain fell over the south end of the Valley, with Bakersfield getting a total of only 0.01 inch of rain for the three-day event, although winds did gust to 37 mph at Meadows Field on the 28th. A weak upper-level trough, trailing the storm, moved through central California on the 29th, keeping unsettled weather over the region through the end of the month.

*A rainbow that formed on January 27th after a storm passed by. View looking east from the west side of Hanford.*

**FEBRUARY 2008 WEATHER SUMMARY**

The unsettled weather from the last days of January continued into the first few days of February, as the next Pacific storm dropped out of the Gulf of Alaska and into California. By the time the storm ended on the 3rd, Fresno's three-day rain total was 0.67 inch, and stations from the Merced airport south through Bakersfield reported storm totals between 0.60-0.70 inch, except for the rain-shadowed west side of the San Joaquin Valley, where the Hanford airport had less than half an inch of rain.

In the Southern Sierra Nevada, up to 18 inches of snow fell in the high country above 7000 feet, with 4-6 inches of snow falling in the Tehachapi Mountains. The storm brought a push of cold air to the region, resulting in low snow levels. Measurable snow fell into the Sierra foothills and below the Pass level in the Tehachapi Mountains. The storm also brought gusty winds to the region. Gusts to 45 mph were recorded in the central San Joaquin Valley during the afternoon and night of February 2nd, and gusts over 50 mph hit the Indian Wells Valley on the 3rd.

A tranquil weather pattern set in behind the storm. An upper-level ridge of high pressure built into California on the 8th. The stable airmass combined with surface moisture from the earlier rains for the development of dense fog during the night of February 8th-9th. After a brief respite from the fog on the 10th, dense fog returned the next two nights. The fog was a major factor in a series of chain-reaction accidents on Highway 99 near Kingsburg during the morning of February 12th. At least four separate accidents occurred, involving at least 40 vehicles and resulting in at least 10 people being injured.

A dry cold front moved through California on the 13th. Winds gusted to around 50 mph in the Kern County mountains and deserts on the 13th, with a gust to 76 mph reported by the RAWS above Walker Pass and a gust to 82 mph measured by the Jawbone Canyon RAWS. The winds continued into the morning of the 14th in the high country of the Southern Sierra Nevada, and were observed in the Diablo Range on the west side of the San Joaquin Valley; whitecaps were reported on the San Luis Reservoir on the morning of February 14th.

A cold airmass settled into the San Joaquin Valley behind the cold front, bringing frost to the Valley floor. Low temperatures in the central and southern San Joaquin Valley the morning of February 15th were as low as 28 degrees, and over a dozen stations had lows below 32 degrees.

High pressure built back into California on February 16th, warming temperatures to near to a few degrees above normal. Temperatures continued to warm through the 18th, ahead of a series of three Pacific storms that moved through the central California interior from February 20th through the 24th.

The storms brought a mix of rain, mountain snow, and thunderstorms to the region. As the first storm moved into central California, a severe thunderstorm developed southwest of Lake Isabella during the late morning (1030 PST) of February 20th, with nickel-size hail reported near the town of Havilah. Other thunderstorms developed over the southern San Joaquin Valley shortly after noon, but did not reach severe levels. As the cold front moved through the Kern County deserts during the afternoon of the 20th, it generated wind gusts of 45 to 55 mph.

The second storm brought up to 15 inches of snow to the high country of the Southern Sierra Nevada, while the third storm brought more than double that amount to the Sierra on the 23rd and 24th. A severe thunderstorm developed near Arvin at 1246 PST on February 22nd, with nickel-size hail reported. Thunderstorms continued over the central and southern San Joaquin Valley through the afternoon of the 22nd, but these storms remained below severe levels.

The third storm brought gusty winds to the central and southern San Joaquin Valley on the 23rd and 24th, with a gust to 53 mph recorded at Meadows Field, Bakersfield, and gusts estimated as high as 70 mph over the far south end of the San Joaquin Valley, as southeast to south winds funneled through the Tehachapi Pass and the Grapevine onto the Valley floor. Gusts to 36 mph were measured

as far north as Castle Airport at Atwater, in Merced County.

There was strong rain-shadowing over the southern San Joaquin Valley, as southwest winds aloft carried the storms through central California. Fresno had a five-day storm total of 1.45 inch, 68 percent of the total rainfall for February of 2.12 inches. Bakersfield received only 0.22 inch of rain for the five-day period, and only trace amounts fell at Meadows Field on February 21st and 23rd. (Fresno's rainfall for the month matched its 30-year normal rainfall for February of 2.12 inches. Bakersfield had a monthly total of 0.82 inch, 67.8 percent of its normal of 1.21 inch.)

High pressure aloft built over California behind the storm complex. Despite abundant ground moisture and a stable airmass, only patchy fog developed across the central and southern San Joaquin Valley, with dense fog limited to the Madera-Merced-Atwater and Hanford-Visalia-Selma areas. Temperatures warmed to well above normal under the upper-level ridge, with both Bakersfield and Fresno warming into the mid 70s on the 29th. Fresno tied its record high of 76 degrees for Leap Year Day, a record last set in 1924.

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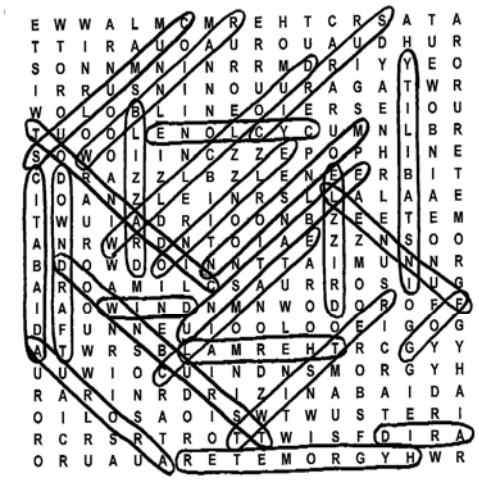
Weather Words Solution



*adiabatic, arid, aurora, blizzard, climate, cirrus, cumulus, cyclone, downburst, downdraft, drizzle, el nino, fog, funnel, hygrometer, instability, monsoon, rainbow, thermal, tornadic, twister, unstable, wallcloud, wind*

## Attention Motorists!

Need to know the latest road reports when you are traveling?
CalTrans has set up a special number you can call to find out the status of roads.
**Dial 1-800-427-ROAD**.

## *Sudden Sight In The Sky…*

*Late on the afternoon of December 19th, a sun dog formed in Hanford. This photo was taken looking southwest from the National Weather Service Office. A sun dog is caused by the refraction of sunlight by ice crystals in clouds. Sun dogs typically form when the sun is low, which is around sunrise and sunset. Sun dogs are often confused with being the actual sun.*

| Runnin' the Numbers | | Fresno | | | Bakersfield | | |
|---|---|---|---|---|---|---|---|
| | | Dec 2007 | Jan 2008 | Feb 2008 | Dec 2007 | Jan 2008 | Feb 2008 |
| TEMPERATURE ($^{O}$F) | Average Maximum | 54.4 | 55.0 | 61.4 | 56.1 | 57.5 | 63.0 |
| | Average Monthly | 45.5 | 46.9 | 51.1 | 46.3 | 48.9 | 52.4 |
| | Departure from Normal | 0.3 | 0.9 | -0.3 | -0.9 | 1.1 | -0.9 |
| | Average Minimum | 36.5 | 38.8 | 40.8 | 36.4 | 40.3 | 41.9 |
| | Maximum | 68 | 65 | 76 | 70 | 70 | 77 |
| | Date(s) | 3rd | 26th | 29th | 4th | 26th | 29th |
| | Minimum | 29 | 32 | 35 | 29 | 31 | 36 |
| | Date(s) | 27th | 2nd, 18th, 19th, 22nd | 5th | 27th | 18th | 5th, 6th |
| | Number of Days Max > 90 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Number of days Min 32 or less | 8 | 4 | 0 | 9 | 3 | 0 |
| | | | | | | | |
| PRECIPITATION (In.) | Total | 2.31 | 3.32 | 2.12 | 0.36 | 0.66 | 0.82 |
| | Departure from Normal | 0.97 | 1.16 | 0.00 | -0.39 | -0.52 | -0.39 |
| | Greatest in 24 hrs | 1.82 | 1.23 | 0.63 | 0.24 | 0.30 | 0.55 |
| | Date(s) | 18th-19th | 4th | 20th | 18th | 23rd | 2nd-3rd |
| | Number days w/precip. | 9 | 15 | 8 | 7 | 12 | 9 |
| | Seasonal Total | 2.64 | 5.96 | 8.08 | 0.83 | 1.49 | 2.31 |
| | Departure from Normal | -0.73 | 0.43 | 0.43 | -1.05 | -1.57 | -1.96 |
| | Compared to Normal | 78.3 | 107.8 | 105.6 | 44.1 | 48.7 | 54.1 |
| | | | | | | | |
| WIND (mph) | Peak Speed | 31 | 39 | 35 | 28 | 49 | 53 |
| | Direction | SE | SE | NW | NW | SE | SE |
| | Date(s) | 7th | 24th | 14th | 7th | 26th | 23rd |
| | | | | | | | |
| PRESS (in.) | Highest | 30.53 | 30.42 | 30.39 | 30.53 | 30.42 | 30.38 |
| | Date | 22nd | 31st | 5th | 22nd | 31st | 7th |
| | Lowest | 29.69 | 29.64 | 29.74 | 29.72 | 29.67 | 29.72 |
| | Date | 7th | 27th | 14th | 1st | 27th | 13th |

*In The Clear* is a newsletter issued by the:

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